

# *A Survey of Profiler Applications for Warnings and Forecasts*



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# *Overview*

- Focus on “local use” at WFOs and SPC.
- Emphasis primarily on wind profiles and NOAA Profiler Network.
- Will not be discussing how profiler data are used in models.
- Will not address use by private sector and others.

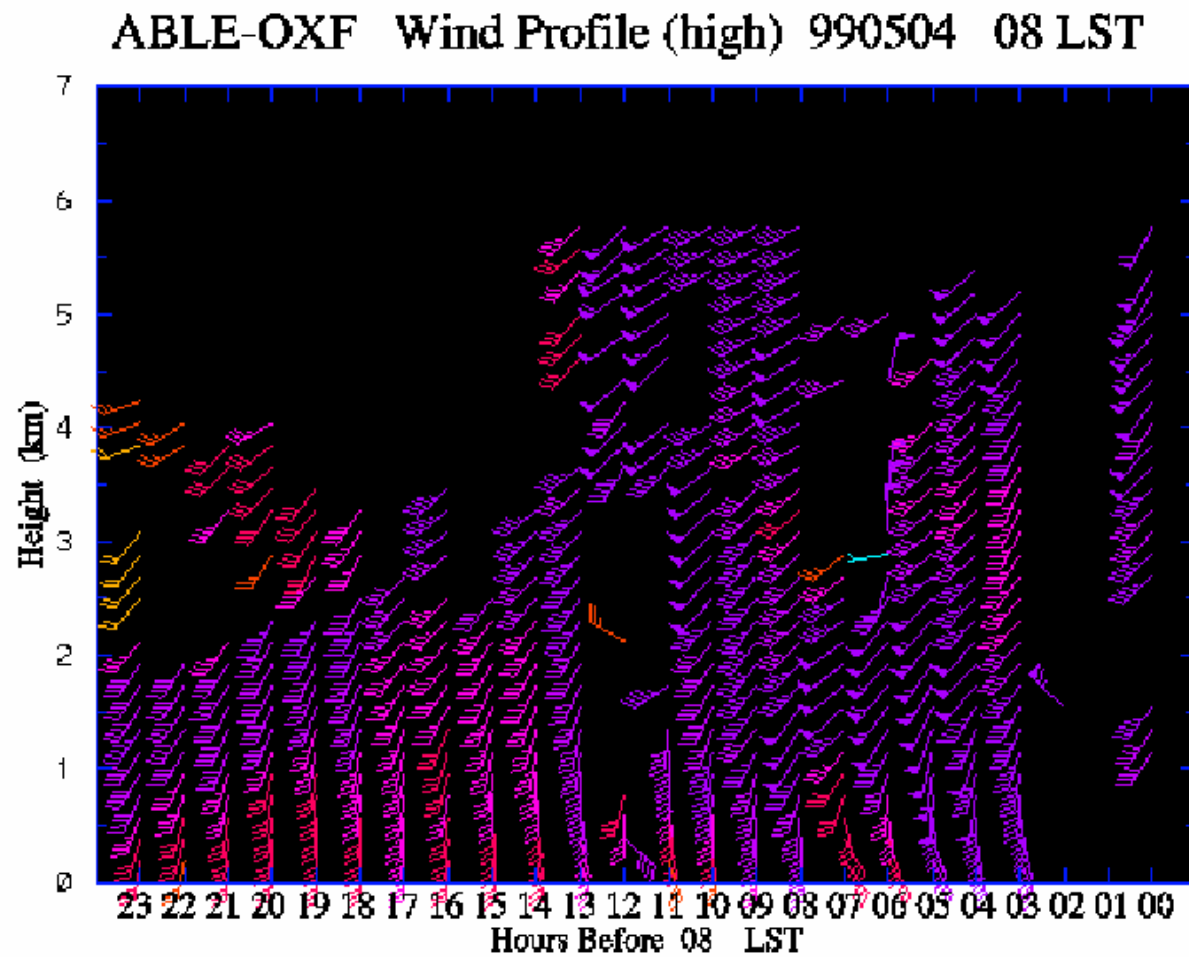
# *Forecasters use profilers primarily...*

- ... for synoptic analysis, along with other observations.
- ... to evaluate model guidance.
- ... for additional, and particularly more timely information...

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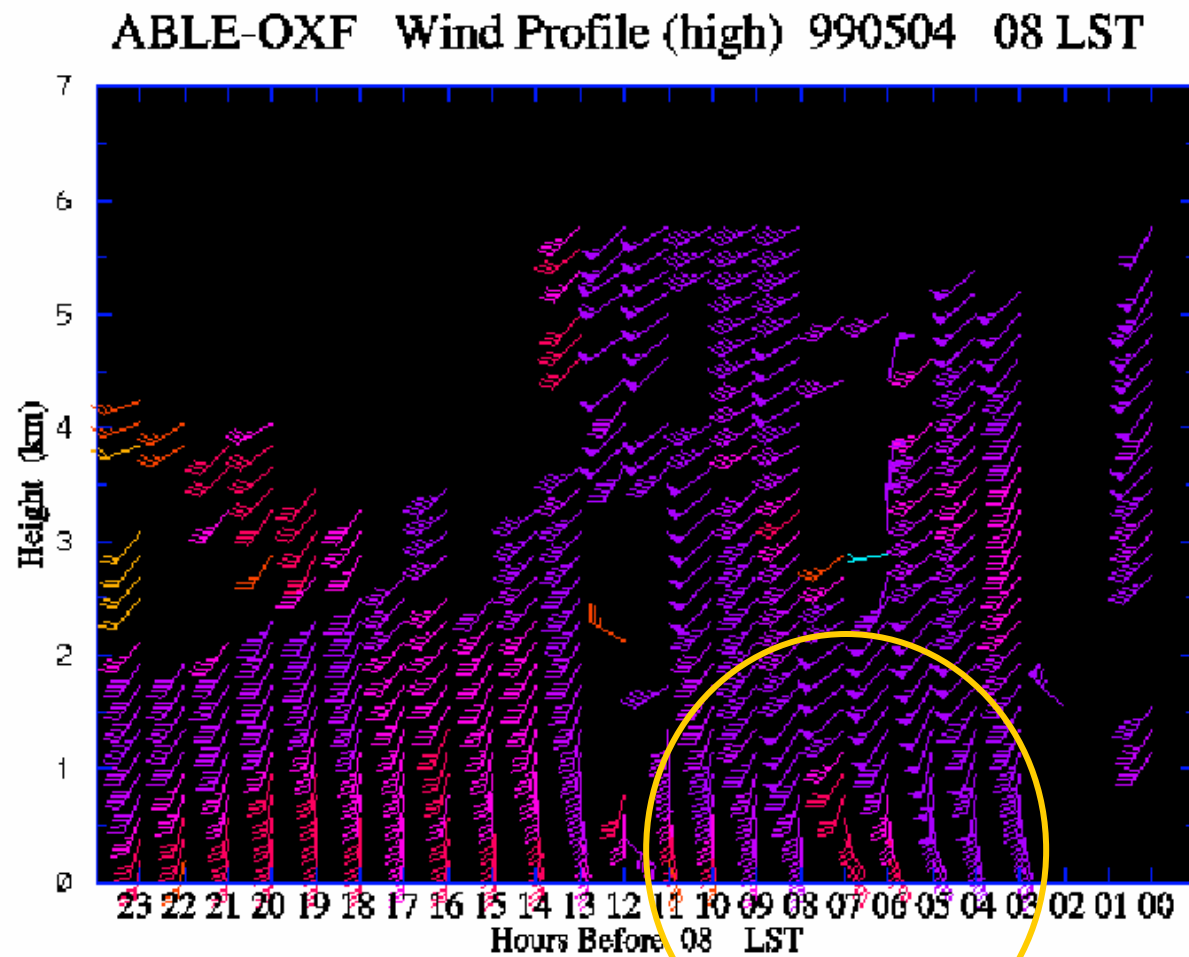
- ... for synoptic analysis, along with other observations.
- ... to evaluate model guidance.
- ... for additional, and particularly more timely information...
  - short-term changes (mesoscale)
  - pre-storm environment
  - evolving jet streaks
  - low-level jet/moisture advection ...

## 915 MHz BLP in southern Kansas



# 915 MHz BLP in southern Kansas

May 3, 1999



“... the profiler at Tucumcari...  
showed a descending and  
strengthening jet approaching  
Oklahoma ... deeper, stronger  
and lower ... than forecasts  
from numerical models and  
favored the development of  
supercells.”



*Service Assessment*

**Oklahoma/Southern Kansas  
Tornado Outbreak of May 3, 1999**



U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Weather Service  
Silver Spring, Maryland



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- SPC increased risk to HIGH
- Recommendation 1: Support  
NPN as operational system



*Service Assessment*

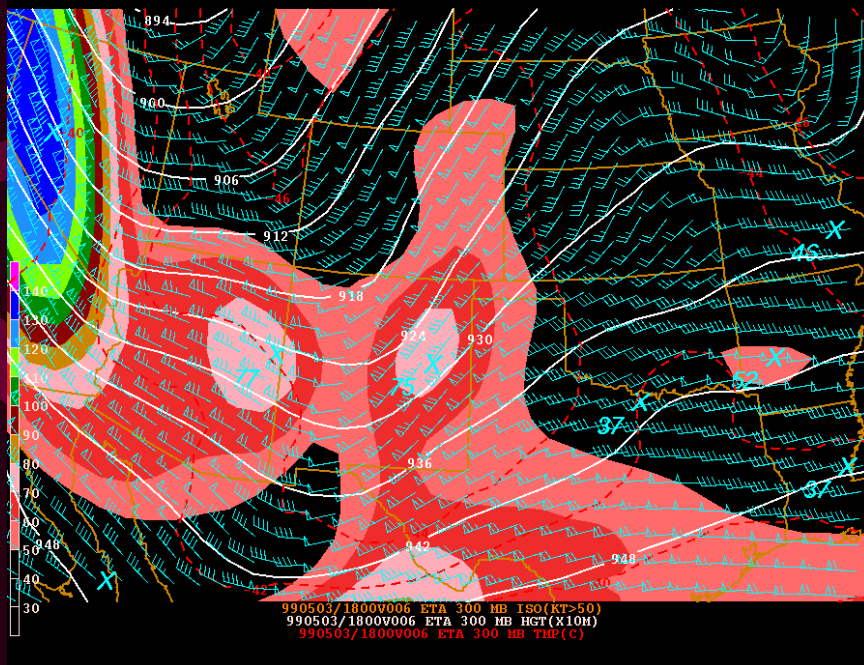
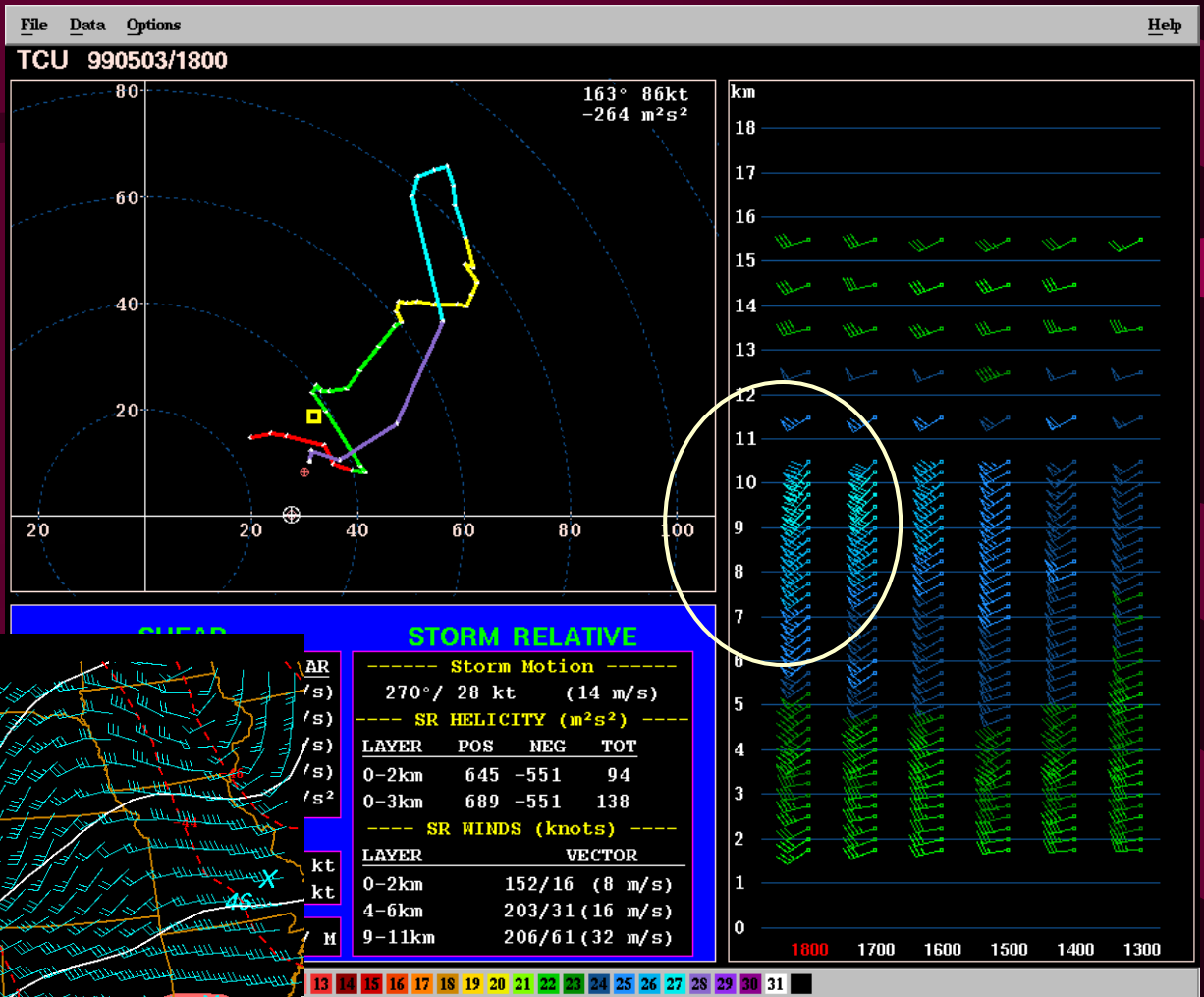
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Tucumcari profiler at 18Z. 300mb winds over NE New Mexico stronger than model forecast.



Eta 300mb 6-hr fcast valid 18Z

# *Forecasters use profilers ...*

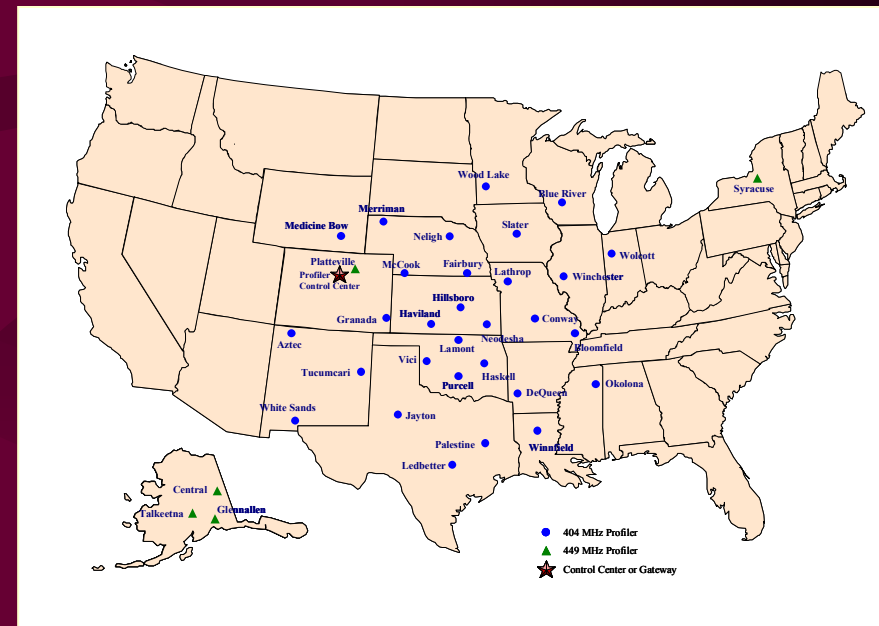
In support of all operations –

- Aviation
- Marine
- Public forecasts
- Fire weather
- Warning operations

# Profiler use survey ...

On a scale of 1-10, how would you characterize the use of profiler data at your office?

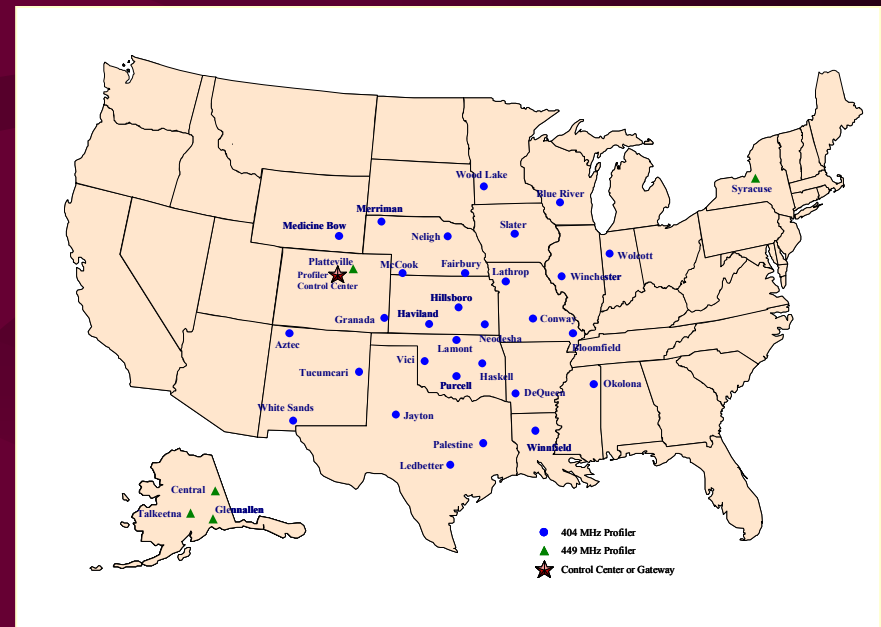
10 = All forecasters well trained and use the data when and as necessary.  
1 = What's a profiler?



# Profiler use survey ...

On a scale of 1-10, how would you characterize the use of profiler data at your office?

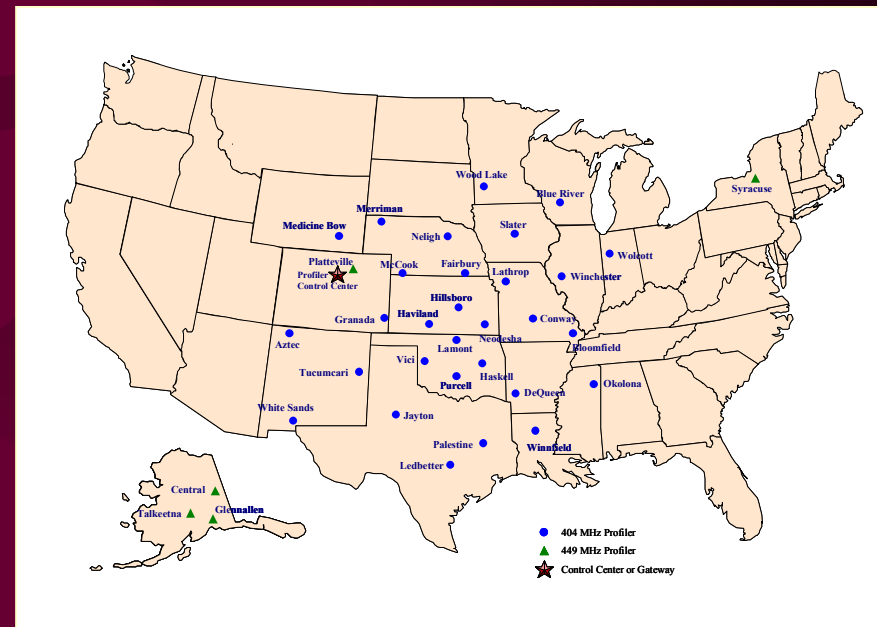
9



# Profiler use survey ...

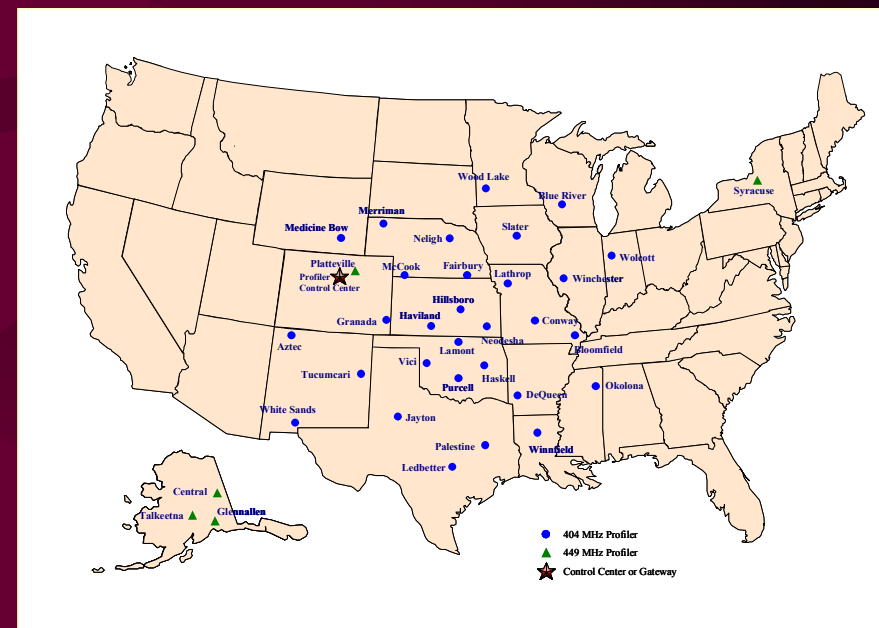
What limits the use of profiler data?

- Not enough profilers.
- Limited AWIPS displays (need derived fields, etc.)
- Updated training.
- Need 6-minute data.
- Not all profilers/GPS sites on AWIPS.



# Profiler use survey ...

All responding offices indicated they had at least one (usually several) cases during the past year when profiler data contributed uniquely and significantly to warnings and forecasts.





# *Forecast Discussions show use of profilers*

... PROFILER NETWORK SHOWS THIS FEATURE TO  
BE STRONG WITH WINDS EXCEEDING 100 KTS ...

Tallahassee (aid synoptic overview)

... WINDS ON MEDICINE BOW PROFILER CONTINUE  
TO ROAR AT 50 KTS FROM 700 MB DOWNWARD ...  
10-20 KTS HIGHER THAN MODELS ...

Cheyenne (adjust model guidance)

... DEEPEST NLY FLOW IS OUT NEAR KS/CO BORDER  
PER GRANADA WIND PROFILE DATA ...

Pueblo (supplemental observation)

... PROFILER DATA OVER ERN KANSAS SUPPORTS  
50KT LLJ...GIVING CREDENCE TO DEVELOPING ...

Grand Rapids (model validation)

... UVV AIDED BY LFQ OF 110KT JET PUNCHING  
ACROSS SRN WI BUT PROFILER CHARTS/WV  
IMAGERY INDICATE NOSE OF JET AND ASSOC  
FORCING NOW HEADED INTO ERN UPPER WI ...

Marquette (adjust guidance)

...GRANADA PROFILER SHOWING ABT A 2 KM  
DEEP AIRMASS BUT WINDS CONTINUING TO  
VEER WITH TIME ...

Amarillo (added information -fog case)

# *Comparing sources of winds aloft data ...*

Profilers are not likely to become THE source of upper air data, but they complement and can add to other data sources ... so let's examine ...

# *Winds aloft ...*

## Profilers

- Hourly (6-min possible)
- High vertical resolution
- Good horizontal resolution  
(but limited NPN area)
- On AWIPS, but ...

# *Winds aloft ...*

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## Radiosondes

- 12-hourly (+ specials)
- About the same
- About the same  
(nationwide)
- On AWIPS+

# *Winds aloft ...*

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**+ Timeliness**

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**+ Coverage**

# *Winds aloft ...*

## Profilers

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## WSR-88D VAD

- 5-minute (areal average)
- Less, possibly height ltd
- About the same spacing  
(but no plot available)
- On AWIPS (vertical  
profile only)



# *Winds aloft ...*

## Profilers

- Hourly (6-min possible)
- **High vertical resolution**
- **Good horizontal resolution**  
(but limited NPN area)
- On AWIPS, but ...

**+ Vertical resolution**

**+ Horizontal plots**

## WSR-88D VAD

- **5-minute (areal average)**
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# *Winds aloft ...*

## Profilers

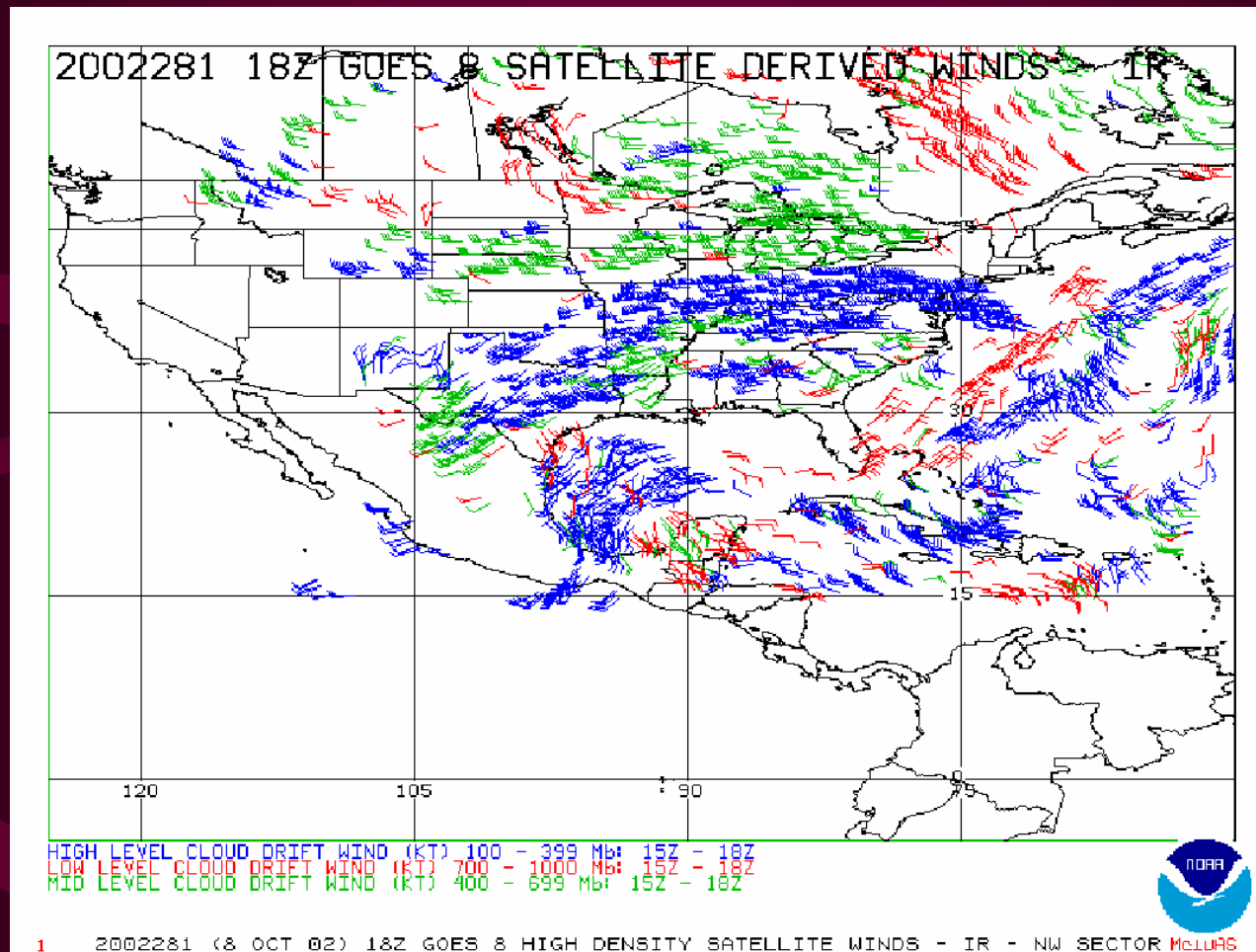
- Hourly (6-min possible)
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(but limited NPN area)
- On AWIPS, but ...

## Satellite Winds

- 3-hourly
- Poor (low, mid, high)
- At best very good \*  
(but at worst unavailable)
- Not on AWIPS (SBN)

\* also over water

# Satellite winds analysis ...



# *Winds aloft ...*

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**+ Timeliness**

**+ Vertical resolution**

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**+ Coverage**

**- Availability**

# *Winds aloft ...*

## Profilers

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(but limited NPN area)
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## ACARS

- hourly or less (possible)
- High (possible)
- May be good (where and  
when traffic dependent)
- Not on AWIPS

# *Winds aloft ...*

## Profilers

- Hourly (6-min possible)
- High vertical resolution
- Good horizontal resolution (but limited NPN area)
- On AWIPS, but ...

## ACARS

- hourly or less (possible)
- High (possible)
- May be good (where and when traffic dependent)
- Not on AWIPS

High potential when and where available (and if?)

## *To summarize ... Profilers ...*

- Are used in conjunction with other data.
- Are well used and relied upon (where available).
- Can provide unique information - sometimes critical (timeliness).

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We should work toward taking fullest advantage.

- Additional training
- Data and applications on AWIPS
- Expand the profiler network.



# *Thanks ...*

Peter Wolf

Ray Wolf

Dan Baumgardt

Preston Leftwich

Pat Welsh

Jim Johnson

Carl Dierking

WFO Wichita

WFO Davenport IA

WFO La Crosse WI

SSD/CRH

WFO Jacksonville

WFO Dodge City

WFO Juneau

and all the other SR and CR SOOs who provided input

# Using GPS moisture soundings ...

